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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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BRIARCLIFF MANOR, NY 10510

EXAMINER

PULLIAS, JESSE SCOTT

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/552,772	Applicant(s) SCHUIJERS ET AL.	
	Examiner JESSE S. PULLIAS	Art Unit 2626	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 October 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on 12 October 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Specification

1. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed. The following title is suggested: "Converting Decoded Sub-band Signal into a Stereo Signal."
2. The examiner requests the following portions of the specification be clearly titled.

BACKGROUND OF THE INVENTION.
BRIEF SUMMARY OF THE INVENTION.
BRIEF DESCRIPTION OF THE DRAWINGS.
DETAILED DESCRIPTION OF THE INVENTION.

Information Disclosure Statement

3. The listing of references in the specification is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609.04(a) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered.

Claim Rejections - 35 USC § 101

4. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claim 18 is rejected under 35 U.S.C. 101 because the claimed invention is directed to a generic computer program product with software code, which is non-statutory subject matter.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1, 2, 7-11, and 16-18 are rejected under 35 U.S.C. 102(b) as being anticipated by Shimoyoshi et al. (5,461,378).

With respect to Claims 1, 16, and 18, Shimoyoshi discloses synthesizing an output audio signal (**Col 18 lines 16-18**, the reproduced signal is synthesized) on the basis of an input audio signal (**Col 4 lines 59-60**, audio PCM signal), the input audio signal comprising a plurality of input sub-band signals, (**Col 4 lines 60-63**, the signal is divided into sub-bands which are input to the coder) the method comprising the steps of:

transforming (T) at least one input sub-band signal from sub-band domain to frequency domain to obtain at least one respective transformed signal, (**Col 5 lines 25-30, MDCT**)

delaying (**Col 5 lines 66-67**, block floating is performed, which involves delaying, as seen in **Col 6 lines 52-54**) and transforming the at least one input sub-band signal to obtain at least one respective transformed delayed signal (**Col 6 lines 1-3**, the delayed output is transformed)

deriving at least two processed signals from the at least one transformed signal and the at least one transformed delayed signal, (**Col 8 lines 33-37, and lines 56-62**, signals that have been subjected to block floating and transformed are sent to a bit allocating unit)

inverse transforming the processed signals from frequency domain to sub-band domain to obtain respective processed sub-band signals (**Col 13 lines 61-65, IMDCT**), and

synthesizing the output audio signal from the processed sub-band signals (**Col 18 lines 16-18**, the reproduced signal is synthesized).

With respect to claim 17, in addition to the limitations of claim 1, it contains a decoder, which is disclosed by Shimoyoshi (**Col 4 lines 10-12, Fig 9**).

With respect to claim 2, Shimoyoshi discloses the transforming is a cosine transforming and the inverse transforming is an inverse cosine transforming (**See Fig. 1 MDCT 123, and Fig. 9 IMDCT 223**).

With respect to claim 7, Shimoyoshi discloses the at least one sub-band signal includes the sub-band signal having the lowest frequency (**Col 4 lines 65-66**, 0-5kHz).

With respect to claim 8, Shimoyoshi discloses the at least one sub-band signal consists of 2 to 8 sub-band signals (**Col 4 lines 59-67**, there are 3).

With respect to claim 9, Shimoyoshi discloses the synthesizing step is performed in a sub-band filter bank for synthesizing (**Col 18 lines 13-18**) a time domain version of the output audio (**Col 18 lines 17-18**) signal from the processed sub-band signals.

With respect to claims 10 and 11, Shimoyoshi implies the sub-band filter bank is a complex sub-band filter bank (**Col 4 lines 62-63** disclose a QMF used in the encoder. **Col 18 lines 13-14** disclose a band synthesis filter).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 3 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimoyoshi et al. (5,461,378) in view of Malvar (6,487,574).

With respect to claims 3 and 4, Shimoyoshi discloses that the input sub-band signals comprise complex samples (**Col 4 lines 60-63, Col 5 lines 8-11**, the output of the QMF filters necessarily are a complex number which is why the absolute values of the samples are taken) and wherein a real value of a given complex sample (**Col 5 lines 8-11**, absolute value) is transformed in a first transform (**Col 5 lines 24-26**). Shimoyoshi does not specifically mention that a complex value of the given complex sample is transformed in a second transform.

Malvar teaches a real value of a complex samples is transformed in a first transform, and a complex value is transformed in a separate, but equal, transform (**Fig 3 Transform Processor 322**).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the invention of Shimoyoshi to include a separate but equal transform of a complex value as taught by Malvar, in order to preserve phase information, as suggested by Malvar (**Col 2 lines 37-42**). The inventions are analogous because they are both related to sub-band audio coding.

9. Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimoyoshi et al. (5,461,378) in view of Gerzon (5,555,306).

Consider claims 5 and 6, Shimoyoshi does not specifically mention the processing comprises a matrixing and rotation operation.

Gerzon discloses processing comprising a matrixing and rotation operation (**Col 7 lines 59-62**).

It would have been obvious to one of ordinary skill in the art to try using matrixing and rotating operations in the invention taught by Shimoyoshi for the following reasons: there was a recognized need in the field to reduce signal processing complexity (**See Col 1, lines 52-54**); there were a finite number of identified, predictable ways of combining the matrices representing audio samples; one of ordinary skill could have readily pursued the known matrix combination operations including matrixing and rotation with a reasonable expectation of success; and one of ordinary skill could have used readily available software to implement the matrixing and rotation operations. The inventions are analogous because they are both related to audio signal processing.

10. Claims 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimoyoshi et al. (5,461,378) in view of Wilde et al. (5,235,646).

With respect to claim 12, Shimoyoshi does not specifically mention the input audio signal is a mono audio signal and the output audio signal is a stereo audio signal.

Wilde discloses the input audio signal is a mono audio signal (**Col 4 lines 60-62**) and the output audio signal is a stereo audio signal (**Col 4 lines 19-21**).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the invention of Shimoyoshi by converting mono to stereo as taught by Wilde, in order to make use of stereo sound reproduction devices, which would let the listener perceive a broader sound, as suggested by Wilde (**Col 2 lines 3-6**). The inventions are analogous because they are both related to audio signal processing.

With respect to claim 13, Shimoyoshi does not specifically mention obtaining a correlation parameter which is indicative of a desired correlation between a first channel and a second channel of the output audio signal, wherein the processing is arranged to obtain the processed signals by combining the transformed signal and the transformed delayed signal in dependence on the correlation parameter, and wherein the first channel is derived from a first set of processed signals and the second channel from a second set of processed signals.

Wilde discloses obtaining a correlation parameter which is indicative of a desired correlation between a first channel and a second channel of the output audio signal (**Col 5 lines 32-35**, cross-correlation measure of the output signals),

wherein the processing is arranged to obtain the processed signals by combining the a sub-band and a delayed sub-band (**Col 5 lines 25-31**, the band limited signals are phase shifted, or delayed, and then summed) in dependence on the correlation parameter (**Col 5 lines 31-35**, the cross-correlation measure depends on the phase shifts), and

wherein the first channel is derived from a first set of processed signals and the second channel from a second set of processed signals (**Fig 1**, y_1 is derived from delayed $X(t)$, and y_2 is derived from several processed sub-band signals).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the invention of Shimoyoshi by obtaining a correlation parameter which is indicative of a desired correlation between a first channel and a second channel of the output audio signal, wherein the processing is arranged to obtain the processed signals by combining the transformed signal and the transformed delayed signal in dependence on the correlation parameter, and wherein the first channel is derived from a first set of processed signals and the second channel from a second set of processed signals, for reasons similar to those of claim 12.

With respect to claim 14, Shimoyoshi discloses a processed signal comprises a plurality of output sub-band signals, and a first time domain channel is synthesized on the basis of the output sub-band signals (**Col 18 lines 13-18**). While Shimoyoshi does not specifically mention a second time domain signal, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the invention by making it stereo, thereby including a second synthesized time domain signal, for reasons similar to claim 12.

11. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shimoyoshi et al. (5,461,378) in view of Liljeryd et al. (6,680,972).

With respect to claim 15, Shimoyoshi discloses:

deriving M sub-bands to generate M filtered sub-band signals on the basis of a time domain core audio signal (**Col 4 lines 59-67**, 3 sub-bands are generated from a PCM signal)

generating a high-frequency signal component derived from the M filtered sub-band signals, (**Col 4 lines 62-63**, a 10-20kHz band represents the high-frequencies).

Shimoyoshi does not specifically disclose:

the high-frequency signal component having N-M sub-band signals, where $N > M$,
the N-M sub-band signals including sub-band signals with a higher frequency than any of the sub-bands in the M sub-bands,

the M filtered sub-bands and the N-M sub-bands together forming the plurality of input sub-band signals.

Liljeryd discloses:

the high-frequency signal component having N-M sub-band signals, where $N > M$, (**Col 15 lines 47-51**, the high frequency signal component has QL-L sub-band signals, where $QL > L$, or $Q > 1$, see **Col 16 lines 10-12**, $Q=2$)

the N-M sub-band signals including sub-band signals with a higher frequency than any of the sub-bands in the M sub-bands, (**Col 15 lines 47-51**, all the synthesized sub-bands have a higher frequency than the L lowband channels)

the M filtered sub-bands and the N-M sub-bands together forming the plurality of input sub-band signals.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the invention of Shimoyoshi by taking the above steps taught by Liljeryd in order to implement Spectral Band Replication, which was a well known coding technique for reducing bit-rate while preserving perceptual quality, as suggested by Liljeryd (**Col 1 lines 14-16**).

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

5,974,380 Smyth et al. discloses a multi-channel audio decoder in which a signal is reconstructed from encoded sub-bands

7,006,636 Baumgarte et al. disclose an auditory scene synthesis system that modifies parameters according to coherence within the bands

5,835,375 Kitamura discloses an MPEG audio decoder including a sub-band reconstructor and IDCT.

6,005,946 Varga et al. disclose a method for generating a stereo signal from a mono signal

6,199,039 Chen et al. disclose a synthesis method for MPEG-II audio decoding

Art Unit: 2626

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jesse Pullias whose telephone number is 571/270-5135. The examiner can normally be reached on M-F 9:00 AM - 4:30 PM. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Hudspeth can be reached on 571/272-7843. The fax phone number for the organization where this application or proceeding is assigned is 571/270-6135.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Jesse S Pullias/
Examiner, Art Unit 2626

/Talivaldis Ivars Smits/
Primary Examiner, Art Unit 2626

3/14/2008